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and
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Abbreviations and acronyms

ANR	Amani Nature Reserve
CBFM	community based forest management
DBH	diameter at breast height
JFM	joint forest management
PRA	Participatory Rural Appraisal
VFC	village forest committee

Abstract

In recent years, there has been a move in eastern and southern African countries from centralised and state-driven management of natural resources towards decentralised and people-centred based regimes. In Tanzania, the inception of the 1998 national forest policy has led to institutionalisation of community-based forest management (CBFM) and joint forest management (JFM). A number of years later, it is worth assessing the impact of this policy on the resource base and people's livelihoods. This paper uses two case studies of forest reserves under participatory forest management to explore this issue. Secondary data was gathered from various studies conducted in those two forest reserves. In addition to the analysis carried out by the various authors, further analysis involving content and structural analysis and synthesis of documented information was done. The results of the study revealed that CBFM at Duru-Haitemba had a positive impact on the resource base and people's livelihoods – the forest is healthier than before and people are satisfied with the products they collect from the forests. On the other hand, the impact of JFM at Kwizu Forest Reserve has not yet produced desirable results since illegal activities are still rampant and, apparently, forest exploitation has increased instead of decreasing. The reasons behind the success at Duru-Haitemba and relative failure at Kwizu are varied, but are most probably linked to ownership of resources and law enforcement. Clear definition of rights, returns and responsibilities and adequate incentives are important for sustainability of people-centred management of natural resources.

1 Introduction

Background

Prior to colonialism, traditional land use was in harmony with the environment, because over the centuries societies had developed their own social customs and regulations, which ensured sustainable use of land-based natural resources from one generation to the next. Individual land use practices were governed by customs and regulations in such a manner that they were considered socially acceptable (Kowero 1990). Local communities relied on natural resources around them and thus exploited them with restraint (Western & Wright 1994).

During the colonial era, natural resources conservation policies were introduced, which meant taking large tracts of land away from rural people for the establishment of protected areas and removing their jurisdiction over the land (Murphree 2000). Thus protected areas were established at the expense of local people and often deprived them of their traditional economic livelihoods. As a result, local people considered protected or reserved areas as constraints to their livelihoods. Since it was not possible to create rigid separation between land used by local people to obtain natural resource products and those designated by governments as protected areas, encroachment, poaching, and degradation were inevitable (Primack 2002).

Unfortunately after political independence most governments in Africa embraced and continued colonial biodiversity protection policies. Due to poor outcomes associated with government-centred policies, many conservation policies in Africa failed because traditional local authorities that once controlled these resources have been disenfranchised (Agrawal & Clark 2001). Local people's cultural and socio-economic values regarding the natural resources around them were ignored in most state-centred management activities. According to Agrawal and Clark (2001), if local communities were effectively involved in conservation, the benefits they would receive would create incentive for them to become good stewards of natural resources. On the other hand, if communities are not involved in active management of natural resources it is likely that they will harvest resources at an unsustainable rate.

In this regard, effective decentralisation and devolution of power and control over resources from the centralised state to local communities has become a pressing policy issue throughout the world today (Brown 1999). The involvement of local communities in the management of forest resources can take several forms, depending upon the environment and the degree of involvement. According to Alden Wily (2002), depending upon what is actually agreed in terms of management agreements or contracts between the government and the community, with over-simplification participatory forest management in Africa may broadly assume the following typologies:

- *consultation* where community roles are limited to simple consultation (such as expressed in the forest-farmer commissions in Ivory Coast or the forest committees in Ghana)
- *co-operant management* where the community is assigned more responsibilities, but its roles and powers are limited (for example, Zimbabwe, Zambia and Benin)
- *contractual partnership* where community roles are more substantial but still inequitable (for example, Cameroon, Ethiopia, Nigeria, Madagascar, Sudan, Niger, Mali and Guinea Conakry)
- *consigned management or joint forest management* where the community has all operational powers apart from ultimate authority (such as is being promoted in the Gambia and Tanzania in national forest reserves)
- *community-based forest management* where jurisdiction is fully devolved to the community and sometimes includes ownership of the estate (such as is found in the Gambia, Malawi, Tanzania, Zanzibar, Lesotho, Namibia, South Africa and Uganda).

There is need to evaluate the impact of these forms of collaborative forest management on resource base and people's livelihoods and to analyse critically the reasons for success or failure so as to design appropriate ways forward for ensuring sustainable management of forest resources.

Community involvement forest resource management in Tanzania

During the last decade, Tanzania, like many other eastern and southern African countries, has experienced a number of policy reforms. Most of these reforms were geared towards devolving common pool resources management from the state to lower levels (Alden Wily & Mbaya 2001). More specifically, these policies underlined the need for community participation and empowerment in the management of natural resources in order to achieve sustainable development (Mniwasa & Shauri 2001).

While the importance of community forestry was recognised early in the 1980s (Kajembe 1994), it was not until the mid-1990s that CBFM started making news in Tanzania, particularly with the success stories from Duru-Haitemba Village Forest Reserves. Before the inception of the national forest policy of 1998 (URT 1998), the management of forests in Tanzania was the full responsibility of the government and much of the attention on reforming forest management focused on increasing powers and responsibilities on the government. The focus on management of forest resources by communities or managing them as common property had rarely been considered seriously (WRM 2002). In general, people around forestlands perceived them as government property and as such, they had no say on their management. Generally, this situation has been at the root of most misuses of forests on general lands and illegal activities in reserved forests.

In Tanzania, there are several reasons for the paradigm shift to people-centred forest management to effectively manage protected areas. Kajembe and Kessy (2000) outlined a number of reasons behind this shift, including the failure of the state agencies to manage protected areas effectively; the potential for cost-effective local management of forests; relevance of local knowledge of ecological dynamics to proper management; increased motivation for local communities to conserve forests following recognition of their critical role in the management, eventual increase in tangible benefits from the forest (economic incentives) and sense of ownership regained over their forest resources (empowerment); and the fact that foresters in recent years have begun to question whether the 'policing model' of forest management is the right way forward. Kajembe and Mgoo (1999) highlighted an additional reason for looking for an alternative model of managing forest resources. In the wake of declining budgets and the retrenchment of workers following the structural adjustment programmes of the 1980s and 1990s, government capacity to protect forests based on the policing model of management has progressively deteriorated and hence there was a need for change in forest management policy.

Making the people living adjacent to forests the guardians of the forest resource in the neighbourhood appears to be the most viable, effective, cheaper and long-lasting way to manage natural forest resources (Kajembe et al. 2003). Under the right conditions, such as appropriate legal framework and incentive structures, these people are likely to become the most effective managers and this should be far more cost-effective. The burden of policing by the government should then fall away and the foresters should become technical advisers, not police.

In Tanzania, community involvement in forest management entails mainly two concepts, namely JFM and CBFM. In JFM, the government is the owner but shares duty and benefits with local communities, while in CBFM local communities are both owners and duty bearers (that is, owners, users and managers) (Alden Wily 1997).

Currently, a number of government forest reserves have initiated participatory forest management and are at various stages in the process of implementing JFM. These reserves include, among others, Gologolo, Kipumbwi and Amani Nature Reserve in Tanga region, Udzungwa in Iringa region, Ufiome in Arusha region, Nkwenshoo in Kilimanjaro region, Kitulangh'alo in Morogoro

region and Urumwa in Tabora region (Kajembe et al. 2004b). Examples of forests under CBFM include Duru-Haitemba in Manyara region, Mgori in Singida region and part of South Ruvu Forest Reserve in Coast region (Alden Wily & Mbaya 2001).

However, despite many efforts by governments and development organisations to establish and implement collaborative management, little is known about what has been achieved so far in terms of improving local people's welfare and the resource base condition (Adams & Hulme 2001). It is worth analysing and synthesising the impact of collaborative forest management on the resource base and on the livelihoods of local population in order to answer the questions: 'Has the implementation of people-centred forest management been a failure or a success thus far? Where and why?'

The main aim of this paper is to assess the impact of CBFM and JFM on forest resource base in selected case study forests in Tanzania. Specific objectives include:

- assessment of stocking parameters in the selected forests under both CBFM and JFM (one case for each type of management) before and after
- assessment of the factors that have contributed to successes and failures in CBFM and JFM implementation
- assessment of the impact of people-centred management on biodiversity and livelihoods
- recommendations on how to move forward with people-centred management options.

After the introduction, the paper discusses the methodologies for data collection in both case studies before presenting and discussing the results. The paper presents and discusses results case by case, examining first the impact of each type of management on the resource base and livelihoods, then the reasons for success or failure and lastly the way forward. The conclusion summarises relevant findings and practical implications.

2 Methodology

The study areas

Duru-Haitemba Village Forest Reserves

Duru-Haitemba Village Forest Reserves are under the management of the eight villages which surround them – namely Ayasanda, Riroda, Duru, Hoshan, Endanachan, Bubu, Gidas and Endagwe. They are located in Babati district (about 25km from Babati town), Manyara region. Babati town, which is the regional headquarters, is 167km from Arusha town in the northern part of Tanzania, and about 750km from Dar es Salaam. Rainfall in the area is characterised by bi-modal and irregular rains ranging from 300–1 200mm per year. Rains of short duration occur during October to January while there are rains of long duration from February to May. Duru-Haitemba forests are typical dry miombo woodlands. The dominant species are *Brachystegia microphylla* and *B. spiciformis* (Malimbwi 2003).

The Duru-Haitemba Village Forest Reserves have a total area of 9 045ha and have been under CBFM schemes since 1994. For management purposes, each of the eight villages has its forest portion. These portions appear in patches and in most cases are not continuous. The forest distribution to villages is as follows: Ayasanda (550ha), Riroda (1 800ha), Duru (1 500ha), Hoshan (400ha), Endanachan (400ha), Bubu (2 300ha), Gidas (875ha) and Endagwe (1 220ha). The purpose of this distribution is to empower specific villages to formulate close forest resource use controls, monitoring and evaluation. The forest boundaries for each village are demarcated and shown by paint marks on trees or rocks (Malimbwi 2003). Although the forests have not yet been gazetted by the central government (the procedures are still in process), at the district level the forest is officially registered and recognised.

In each village, there is an established village forest committee (VFC), which is responsible for village forest management. The members of the VFC are selected from among the villagers with equal representation from each sub-village in each village. The VFC is thereafter recognised as forest manager, working under the supervision of the village government.

Kwizu Forest Reserve

Kwizu Forest Reserve is located in Same district, Kilimanjaro region, north-west Tanzania. The forest lies between 37°5'–38°00' latitude and 4°10'–4° 25' longitude. The forest reserve is approximately 3 070ha, with distinct highland and lowland parts. The eastern part of the reserve is the highland with steep slopes and an altitude of about 1 300m above sea level. The vegetation in this part of the forest reserve is tropical montane forest with *Leptoncycia usambarensis, Nuxia floribunda, Teclea nobilis* and *Celtis gomphophylla* being the main species. As for the lowland, the area is flat at an average of 900m above sea level and dominated by grasslands and shrubs, with *Combretum exalatum, Commiphora campestris, Tamarindus indica, Acacia tortilis,* and *Chrysanthomoides monilifera* as the commonest species (Kajembe et al. 2004a).

The rainfall pattern is bimodal. Rainfall in the highlands is in the range 600–1 200mm per year, while in the lowland it is 350–600mm. Highland temperature is 18°C–28°C while in the lowland it falls between 24°C and 34°C. Three settlements were studied – namely Mtunguja, Kwizu and Mkonga-Iginyu villages. The predominant ethnic group in all the settlements is Pare. The people in the highlands are predominantly subsistence farmers cultivating mainly maize, banana and coffee, while those in lowland are predominantly pastoralists who keep cattle, goats and sheep.

As early as 1953, the central government had gazetted this forest for production purposes and put it under the management of the local government. The forest reserve was to supply timber, poles, firewood and other forest products through controlled harvesting. Forest officers working under local authority had the obligation of issuing licences for extraction of the forest products (Holmes

1995). It was unlawful for a person to harvest any product without a licence including the removal of dead fallen fuel for domestic use or drawing water for domestic purposes. However, a directive from the Ministry of Lands, Natural Resources and Tourism in 1992 banned all types of harvesting in catchment forests, including Kwizu Forest Reserve. With the inception of the 1998 forest policy, a JFM scheme was initiated in Kwizu Forest Reserve through the establishment of village environmental committees, which was to be followed later by the enactment of by-laws regulating JFM.

Data collection and analysis

At Duru-Haitemba, the forest inventory carried out by Malimbwi (2003) used a sampling intensity of 0.1%. A total of 110 sample plots of 0.07ha each were established temporarily throughout the forest. The plots were allocated for each village forest based on the proportion of the forested village area to the total forest area. The plot layout in each forest was systematic. In each forest, a transect was established in vegetation types that showed distinct differences, and plots laid out at convenient distances depending on the size of the forest. The sample plot comprised four areas of measurement. In the innermost sub-plot with 2m radius, all types of plants including trees, shrubs, herbs and grasses were identified and recorded. Within the 5m radius subplot, shrubs and saplings with diameter at breast height (DBH) of less than 5cm were identified and recorded. In the middle and outer subplots, with radii of 10m and 15m respectively, trees with DBH greater than 10cm and 20cm respectively were identified and measured for DBH and total height of sample tree (a tree nearest to the plot centre). Furthermore, the species name (vernacular and botanical) were recorded along with the number of stems.

Before computation of various stand parameters, a checklist of tree and shrub species was prepared for the entire forest. Botanical names were matched with the local names and arranged alphabetically. Each tree was then given a code number for subsequent calculations. Since only sample trees were measured for total height, a height/diameter relationship was established and the equation was used to estimate the height of trees that were measured for DBH only. The equation was:

$$\mathbf{Ht = Exp\ (0.58048 + 0.602965*Ln\ (DBH))} \qquad \mathbf{(R^2 = 83,\ SE = 1.32,\ N = 132)}$$

Where Ht is total tree height in meters; DBH is tree diameter at breast height; Ln is the natural logarithm; R^2 is the coefficient of determination, SE is the standard error of estimate and N is the number of observations

Basic stand parameters including stand density in terms of number of stems per ha (N), basal area (G, m^2/ha) and volume (V, m^3/ha) were calculated using standard mensuration formulae. Single tree volumes were estimated using the equation developed by Malimbwi et al. (1994):

$$V_i = 0.0001 d_i^{2.032} h_i^{0.66}$$

Where V_i is the volume (m^3) of the i^{th} tree with DBH d_i (cm) and total height, h_i (m).

Furthermore, all computed parameters were clustered into eight size classes as follows:

Size class	DBH range (cm)
1	1–10
2	11–20
3	21–30
4	31–40
5	41–50
6	51–60
7	61–70
8	>70

Herbs and grasses were not analysed quantitatively in this study. However, the information on presence or absence of herbs and grasses and their different types or species has served as a basis for assessing qualitatively the extent of soil and land degradation under the forest.

Socio-economic data was obtained from the studies by Otieno (2000) and Kajembe et al. (2003) which used Participatory Rural Appraisal (PRA) techniques. The PRA group included elders, middle-aged, youth and village government leaders. Methods used in the PRA include, among others, participatory mapping and modelling, historical trends, chapati (or Venn) diagrams for institutional analysis, direct matrix and pair wise ranking and scoring for problem analysis. Checklists were used to collect information from key informants including village leaders, village elders (men and women), village executive officers and village environmental committee members. Data collected through PRA techniques were analysed with the help of the local communities in the PRA groups. Other data were analysed through content and structural-functional analyses.

At Kwizu Forest Reserve, most of the data was collected by the Tanzania Collaborative Research Centre (CRC-TZ) which is part of the International Forestry Resources and Institutions research programme. The data falls into two parts in accordance with International Forestry Resources and Institutions protocols (Ostrom 1998). One part includes data about social attributes while the other comprises of data about forest attributes. Data collection took place during two field visits in July 2000 and July 2003.

Data on socio-economic attributes was collected using PRA methodologies, group discussions and individual interviews with local officials. The local officials interviewed included a forester in charge of the forest reserve and three leaders of non-harvesting organisations. Secondary data was obtained at the village and district level offices.

During forest inventory, the forest reserve was stratified – 15 plots were located in the montane vegetation and 15 plots in the lowland forest. The team applied both systematic and random sampling designs. Starting with a randomly selected plot, the remaining plots were systematically selected, but randomly numbered. After selecting the first plot the location of all other plots in the forest was selected by walking 50m along the transect and turning 90º either right or left, at which point the plot was located 15m from the transect. The directions were alternated after each plot. Once the centre of a plot was located, three concentric circles were marked. In the 1m radius subplot, data was collected on all herbaceous ground cover and seedlings with a diameter of less than 2.5cm. In the middle circle (3m radius) all shrubs and trees were identified, their DBH measured and their heights estimated. Within the 10m radius, only trees with DBH greater than 10cm were measured.

Since the forest was first visited in 2000, the collection of socio-economic and forest data on the 2003 revisit allowed both qualitative and quantitative comparison of management impacts for the three-year period. Qualitative data of 2000 and 2003 was analysed by content analysis, while the quantitative socio-economic data was analysed by descriptive statistical methods (means, standard errors and so forth) and cross tabulation (contingency tables). PRA data was analysed with the help of the local people. From the forest inventory data, stand parameters (density, basal area and volume per ha) were estimated and compared for 2000 and 2003 using cross tabulation. A student t-test was used to compare the basal areas and the density of saplings and mature trees.

3 Results and discussion

CBFM impact on resource base and livelihoods

Impact on stocking parameters

Duru-Haitemba Village Forest Reserves are essentially made up of eight village forest units as each village has its own portion. Each forest unit has its own characteristics (Malimbwi 2003). However, in most cases, each village forest reserve contains patches of forests indicating various stages of development particularly before and after 1994. For example, there are two distinct patches of forests in Ayasanda Village Forest Reserve. The one closer to the village centre is a regeneration of about nine years since the forest came under village management. Before that, the area was almost bare. The other patch is almost intact, perhaps mature miombo woodland, dominated by *Brachystegia microphylla*. At Hoshan village, there are three patches of forest: the Hiyang 'A' patch frequently interrupted by farms that were present before the demarcation of the forest; the Hiyang 'B' patch dominated by abundant regeneration of about ten years of mostly *B. microphylla*; and the Homum patch which seems to be degraded due to overgrazing.

In general, all eight village forest reserves are well protected since there is little or no disturbance in terms of cutting for fuelwood and building poles. However, there was evidence of footpaths throughout the area, indicating frequent visits by villagers, probably, among other reasons, to collect herbal medicine. Few trees have been debarked (most likely in order to dry and be collected later as firewood). Others could have been debarked to get materials for beehives and for medicinal purposes.

Moreover, the intensive grazing has rendered the forest floor open in many places (Malimbwi 2003). Standing crop parameters for Duru Haitemba Village Forest Reserves by village are summarised in Table 1.

Table 1: Stand crop parameters for Duru Haitemba Village Forest Reserves in 2003

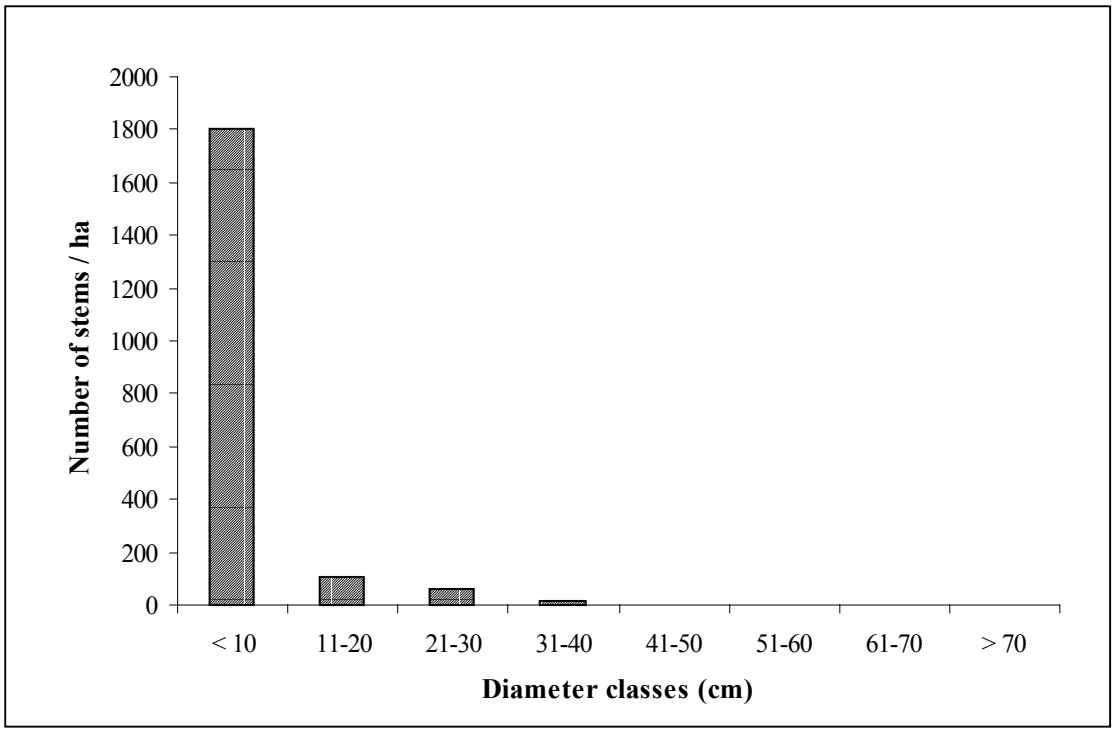
Village	Forest area (ha)	Saplings		No. of species	Stems/ha	Basal area (m^2/ha)	Volume (m^3/ha)
		No. of plots	No. per ha				
Ayasanda	550	8	7 962	12	1 987 ± 558	14.60 ± 1.30	116.60 ± 9.00
Riroda	1 800	20	14 451	26	2 458 ± 283	10.99 ± 0.99	79.86 ± 9.91
Duru	1 500	16	15 924	21	2 132 ± 379	12.20 ± 1.50	90.50 ± 14.20
Hoshan	400	6	6 104	15	1 942 ± 500	12.36 ± 1.70	112.60± 23.82
Endanachan	400	6	2 256	11	1 752 ± 274	12.84 ± 1.06	86.47 ± 7.89
Bubu	2 300	28	13 935	29	2 017 ± 258	11.13 ± 0.70	82.00 ± 6.80
Gidas	875	10	14 451	21	1 358 ± 215	10.96 ± 1.45	88.30 ± 16.30
Endagwe	1 220	16	12 092	22	2 257 ± 305	14.20 ± 1.20	122.20 ± 13.40
Average			**10 897**	**20**	**1 988 ± 347**	**12.41 ± 1.24**	**97.32 ± 12.67**

Source: Synthesised from Malimbwi 2003

The average number of stems was 1988 ± 347 per hectare (Table 1). The distribution of stem numbers per hectare exhibits high number of regeneration of below 10cm DBH (Figure 1). This is an indication of presence of good regeneration but also of the status of a young stand.

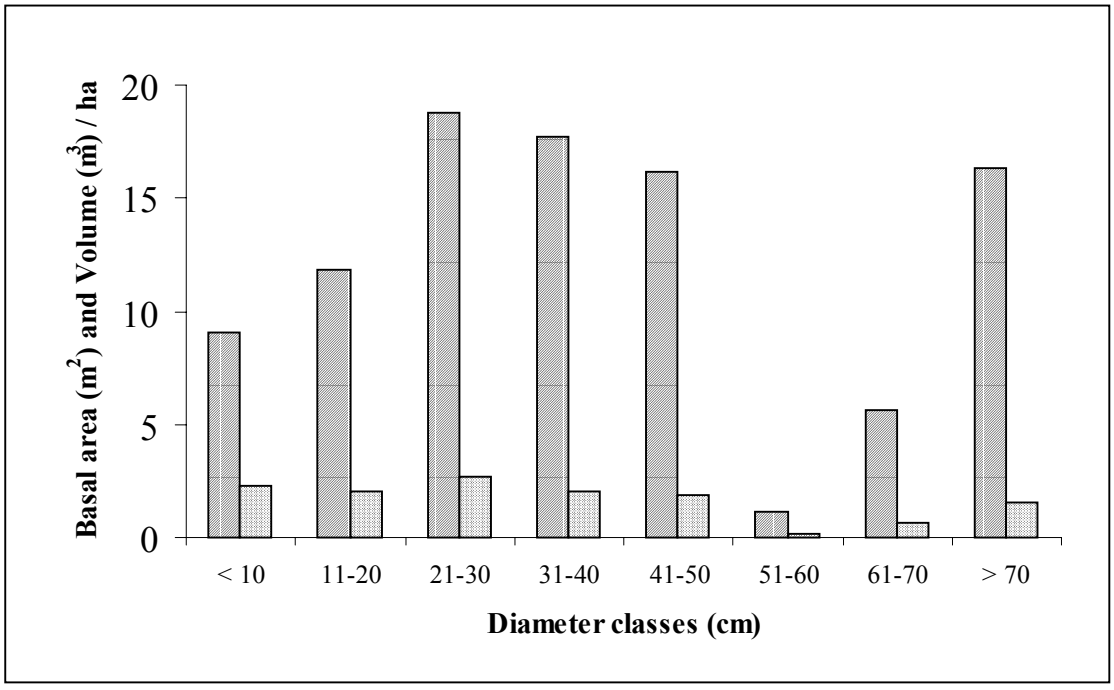
The average volume and basal area were 97.32 ± 12.67m^3/ha and 12.41 ± 1.24m^2/ha. The forest appears to have two distinct canopy strata – the upper canopy is dominated by *Brachystegia spp.* reaching height of about 26m and a lower canopy is occupied by most species with average height of 7m (Figure 2). The two strata can easily be distinguished in the forest, which explains the bimodal distribution shown in Figure 2.

Figure 1: Stocking density distribution at Duru-Haitemba Village Forest Reserves



Source: Synthesised from Malimbwi (2003)

Figure 2: Volume (m^3) and basal area (m^2) per hectare distribution at Duru-Haitemba Village Forest Reserves

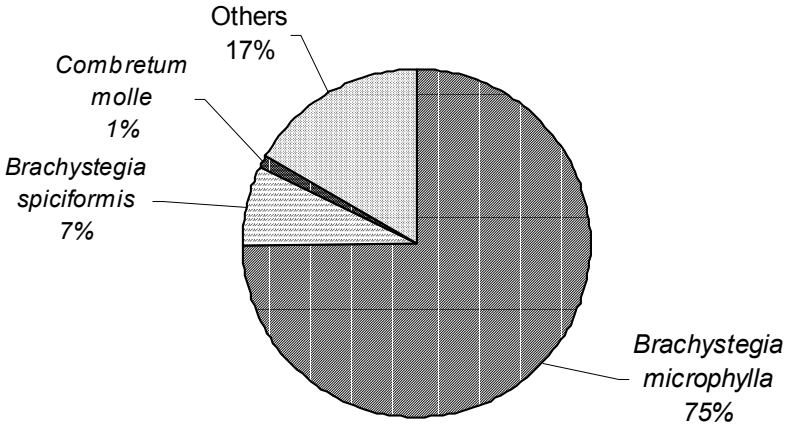


Source: Synthesised from Malimbwi (2003)

Impact on tree species diversity

Apparently, the forest is over-dominated by *Brachystegia microphylla* species in terms of volume per ha (Figure 3). The other dominant species was *B. spiciformis,* which makes Duru-Haitemba typical miombo woodland. The dominant species, *Brachystegia microphylla,* had the most abundant regenerants throughout Duru-Haitemba Village Forest Reserves. An average of 10 897 saplings per hectare were encountered from an average of 20 different tree species in the sample plots surveyed per village forest.

Figure 3: Tree species dominance in Duru-Haitemba Village Forest Reserves



Source: Synthesised from Malimbwi (2003)

Impact on livelihoods of the local people

Local communities living adjacent to the forest derive a number of benefits from the forest. Most destructive uses that lead to the removal of considerable amount of wood biomass from the forest – such as timber, charcoal and building poles extraction – require licences. Harvesting for lumbering and building poles is allowed for trees that have started to dry up. A stumpage of Tshs. 3000/= (about US$3) is paid for a tree. A villager would qualify to buy poles if his or her building is at roofing stage (Malimbwi 2003).

However, there are a number of non-timber forest products extracted freely from the forest. For example, during fieldwork, a beehive was noted in almost every plot (Malimbwi 2003). Kajembe and Kessy (2000) recommended beekeeping as an environmentally friendly income-generating activity that should be promoted in participatory forest management. Grazing is also allowed during the period 1 June–31 December. Grazing may also serve as fire control activity since it reduces fuel load. Firewood collection is normally allowed in the forest as long as the wood is dry. During the survey, no dry wood (standing or fallen) was observed. This is probably an indication of the intensity of firewood collection in the forest (Malimbwi 2003). Other non-timber products that are collected in small quantities from the forest include local medicines, ropes, fruits (for example, *Vangueria infausta, Flacourtia indica*), mushrooms and stones (Malimbwi 2003; Otieno 2000).

Factors behind the success at Duru-Haitemba Village Forest Reserves

Duru-Haitemba forests were reserved as village forest reserves in 1994. This came about as a result of the discontent of local communities at the way the remaining tracts of miombo woodlands were managed by the government. The condition of the woodlands had been progressively degrading due to farming encroachment, grazing, hunting and charcoal burning by local dwellers, and timber extraction by outsiders. The Duru-Haitemba forests had been targeted for gazetting as local

government forest reserve in 1990/1991. However, the programme caused discontent among local people. The process – and the attempt to withdraw the forest from the public domain and put it in the hands of government – was definitely the catalyst for both local concern and the ultimate decision to find a more acceptable and more workable management regime (Alden Wily 1997). After a long process of dialogue, the situation was resolved through the decision to abandon gazetting in favour of allowing and assisting each of the eight surrounding villages to take full rights and responsibility for conservation of the woodlands. Alden Wily (1997) explains that this launched a very dynamic process by villagers involving drawing of simple management plans, which were later rephrased and approved as by-laws by district authorities, setting up of VFCs and selection of village forest guards. The assistance from local foresters and other outside advisers in the whole process was limited to what was needed on an *ad hoc* basis, for example in the cases of legal matters and resolution of inter-village boundary disputes. In short, the Duru-Haitemba model was locally initiated, without outside pressures or the use of blueprint schemes. For Alden Wily (1997), the main role of the government has been 'to let it go'.

Kajembe et al. (2003) outlined the following further factors that were likely to have contributed to the success at Duru-Haitemba. Firstly, each village has clearly defined and hence secure boundaries. Secondly, village governments have worked out rules that clearly define appropriation and provision, and which have facilitated protection and management of the village forest reserves. Thirdly, there is good collective choice of VFCs, which are comprised largely of ordinary villagers. Fourthly, locally-instituted conflict resolution mechanisms are respected by villagers. Fifthly, there are clearly defined resource property rights since each village has obtained its title deeds on its forest. Lastly, there is full empowerment – that is, the villagers have the right to devise their own institutions without being challenged by external government authorities.

Towards sustainability

CBFM has so far proved to be successful as demonstrated by the existence of a healthy forest with little disturbance. The local communities accrue some benefits from the forest as outlined above. However, in the long-run more tangible benefits are needed to attract villagers' full commitment to forest management (Kajembe et al. 2004b).

Controlled harvesting of mature timber species would be one way to improve motivation of villagers to manage the forests. Equitable distribution of revenues accruing from the forests should also be ensured, particularly the improvement of social services such as communication and health facilities. Beekeeping activities should also be promoted in line with market promotion for bee products. The possibilities of selling trapped carbon stocks to potential investors should also be explored (Kajembe & Kessy 2000).

JFM impact to resource base and livelihoods at Kwizu Forest Reserve

Impact on stocking parameters

The volume of wood in Kwizu Forest Reserve was estimated to be 196.3 ± 47.9 (SE) m^3/ha in 2003, which was lower than in 2000 (305 ± 86.12 (SE) m^3/ha). However this difference was not significant (P= 0.136) (Table 2). The basal area followed the same trend as that of volume in both strata (that is, montane forests and lowland woodland). The density of trees showed a contrary trend as the 2003 inventory revealed a density of 972 ± 196 stems per ha as opposed to the 2000 results with 262 ± 58 stems per ha. These results were significantly different (P=0.01) (Table 2). The stocking analysis by diameter classes showed a remarkable increase of stems from 2000 to 2003 in the 1st diameter class comprising seedlings and saplings (Figure 4); in contrast the biggest diameter class showed a reversed trend of remarkable decrease of both the basal area and volume (Figure 5).

Table 2: Comparison of stand parameters by vegetation type in years 2000 and 2003 in Kwizu Forest Reserve, Same district, Tanzania

Forest cover	Stocking*	Years		T-value	P-Value
		2000	2003		
Montane forest	N	471 ± 88	900 ± 165	-2.777	0.005
	G	36.80 ± 7. 27	29.36 ± 5.30	0.827	0.208
	V	552.19 ± 7.54	351.77 ± 76.72	1.205	0.119
Lowland woodland	N	53 ± 14	954 ± 364	-2.471	0.009
	G	5.23 ± 1.38	5.10 ± 1.27	0.073	0.471
	V	58.46 ± 15.97	40.85 ± 12.34	0.873	0.195
All reserve	N	262 ± 58	972 ± 196	-3.463	0.010
	G	21.02 ± 4.67	17.23 ± 3.50	0.649	0.259
	V	305.00 ± 86.12	196.31 ± 47.86	1.106	0.136

** N = Density (stems/ha), G = Basal area (m^2/ha) V = Volume (m^3/ ha)* *Source: Kajembe et al. 2004a*

Figure 4: Distribution of stems/ha by diameter classes in year 2000 and 2003 in Kwizu Forest Reserve, Same district, Tanzania

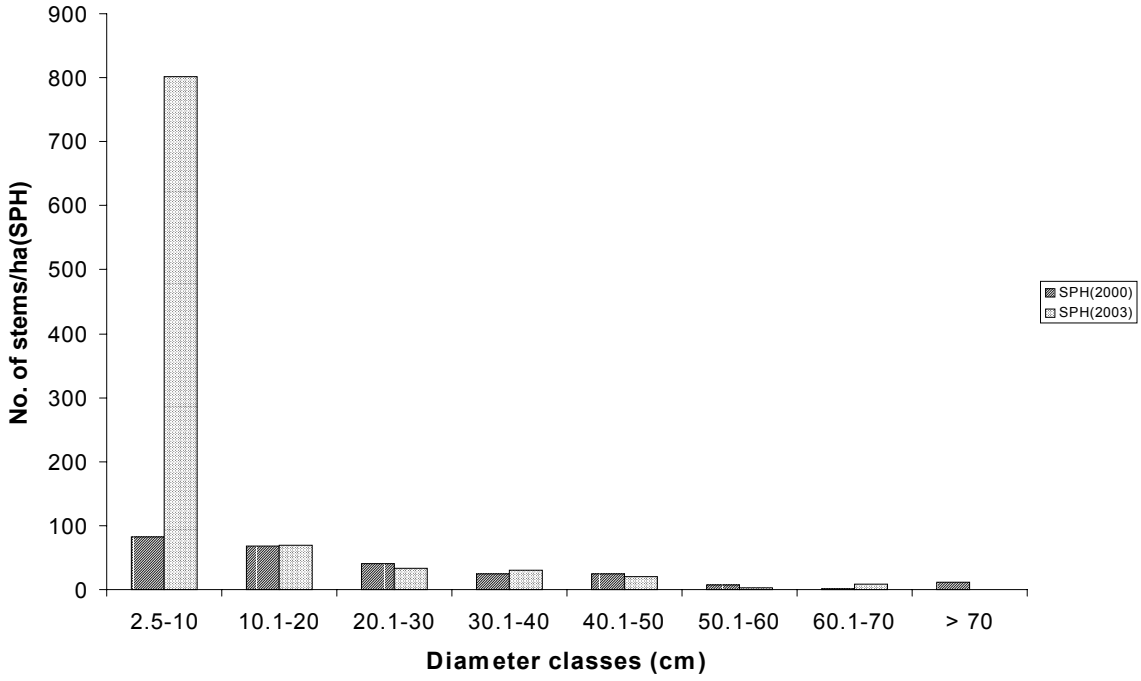
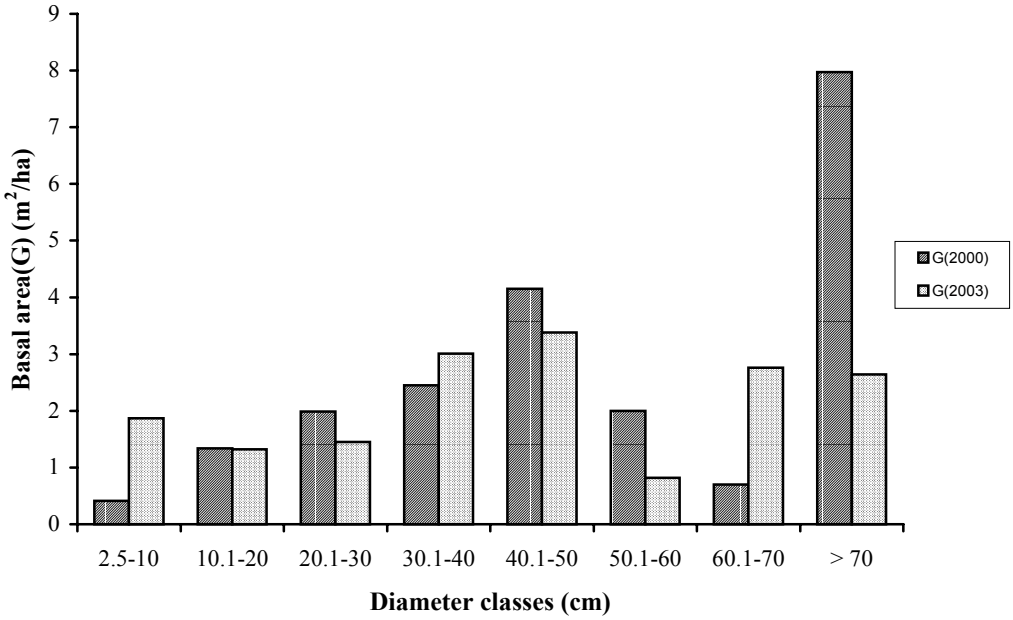


Figure 5: Distribution of basal area (m^2/ha) (same trend as wood volume (m^3)/ha) by diameter classes in 2000 and 2003 in Kwizu Forest Reserve, Same district, Tanzania



Impact on tree and shrub species diversity

Comparison of stocking by species showed that of the ten most dominant species six species – *Albizia anthelmintica, Celtis gomphophylla, Cussonia spicata, Leptonychia usambarensis, Newtonia buchananii* and *Nuxia floribunda* – have decreased in terms of basal area and volume (Table 3). More than 50% of these species yield fine commercial timber and firewood. Due to decreased availability of preferred timber species, some local people were now utilising lesser known planted timber and even fruit tree species.

Impact on livelihoods of local people

The Kwizu Forest Reserve has been managed as stipulated in the old forest ordinance of 1957 and the new Forest Act of 2002 (URT 2002). Under the old ordinance, all authority with regards to management was vested on the Same District Council and the local people could harvest products only if they had a license from the district forest officer. However, as from 1992 harvesting of timber from all water catchment forests (Kwizu included) was banned. Unsurprisingly, both the 2000 and 2003 inventories have revealed that local people and outsiders do not always comply with the imposed institutional set-ups. Illegal harvesting and grazing in Kwizu forest reserve are common – between 2000 and 2003 the district authorities filed 20 cases. About half of these cases (50%) were concerned with possession or transportation of illegally obtained timber, while illegal grazing in the forest accounted for 40% of the cases and only very few cases (10%) involved actual illegal harvesting.

Following the recent countrywide policy initiatives to involve local people in managing natural resources (URT 1998), by the year 2000 village environmental committees had been established in all settlements surrounding the forest reserve. These committees have the mandate to liaise with the district authorities in all issues pertaining to protection of the forest through JFM. However, considering the number of cases of illegal activities, the policy has apparently not yet produced the positive results expected at Kwizu Forest Reserve.

Table 3: Comparison of stocking parameters by species in years 2000 and 2003 for the ten most dominant species in Kwizu Forest Reserve, Same district, Tanzania

No.	Botanical name	Strata	Main use	Stocking parameters*					
				2000			2003		
				N	G	V	N	G	V
1	*Xmalos monospora*	Upland	Timber	61	3.08	32.85	66(+)	4.41(+)	47.56(+)
2	*Leptonychia usambarensis*	Upland	Firewood	63	2.41	31.85	12(–)	0.01(–)	0.02(–)
3	*Acacia tortilis*	Lowland	Firewood	2	0.28	3.23	8(+)	0.56(+)	6.27(+)
4	*Tabernamontana pachysiphon*	Upland	Medicinal	29	0.35	2.97	35(+)	0.0.53(+)	3.91(+)
5	*Nuxia floribunda*	Upland	Timber	17	2.54	32.46	6(–)	1.01(–)	12.99(–)
6	*Celtis gomphopylla*	Upland	Firewood	12	0.71	7.12	3(–)	0.09(–)	0.62(–)
7	*Albizia anthelmintica*	Lowland	Firewood	11	1	10.39	18(+)	0.21(–)	1.11(–)
8	*Newtonia buchananii*	Upland	Timber	3	1.85	39.26	17(+)	1.67(–)	26.96(–)
9	*Taclea nobilis*	Upland	Poles	2	0.16	1.54	12(+)	0.09(+)	0.39(+)
10	*Cussonia spicata*	Upland	Shade	5	2.27	2.37	4(–)	0.27(–)	2.74(–)

** N = Density (stems/ha), G = Basal area (m^2/ha) V = Volume (m^3/ ha) Source: Kajembe et al (2004a)*

Factors behind the lack of positive impact

The enforcement of law at Kwizu Forest Reserve has been generally constrained by the District Council's lack of adequate personnel and funds. The district has only eight full-time and five part-time employees who are supposed to effect law enforcement in eight forest reserves managed by the district (Kwizu inclusive). The district has so far failed to mobilise villages to formulate effective regulations and produce workable management plans.

The continued decline of resource base in the forest (Table 3) suggests a clear institutional failure – the local district government has not safeguarded the forest effectively, which is also evident in the few cases of culprits who have been tried. Moreover, the nature of the reported cases of illegal activities in Kwizu Forest Reserve shows that monitoring is mostly practised along the road and not in the forest where the actual theft is committed. Although each of the surrounding settlements has a village environmental committee to deal with policing issues, actual protection is yet to be realised because by-laws formulated have not yet been enacted as legal instruments.

Moreover, the implementation of JFM would not be expected to be successful when even a basic understanding of processes of local institutional change is low among the foresters who are charged with moving the process forward (Kajembe & Kessy 2000). In fact, a gap still exists between the practice at the resource user level and the implementation of the forest policy on JFM. Foresters are practising JFM as 'trials' and this may lead to avoiding sincere commitment to JFM. The gap between policy and practice may be partly attributed to 'traditionalist approaches' or 'conservatism' to forest management (Kajembe 1994). Moreover, inevitably there are struggles against the devolution of authority, which is equated with the loss of power and status. It is therefore not surprising that there has been and will continue to be some resistance, despite enabling policy and political support of JFM (Kajembe & Kessy 2000).

In addition to a lack of awareness on the JFM package, there is still a poor understanding of whether and when a community has any incentive to take on responsibilities for JFM (Alden Wily & Dewees 2001). In most cases, local communities are not sure of what kind of additional benefits they are going to obtain from the jointly managed forest, beyond what they used to enjoy. For JFM to be successful, there is need to define clearly the rights, returns and responsibilities for each stakeholder in JFM (Dubois 1999).

Towards sustainability

It is apparent that more incentives are needed to persuade local communities from degrading or destroying their forest reserves. In fact, most of the entitlements which are granted to local communities as part of the JFM agreements are too trivial to serve as incentives for active participation. In most cases villagers are allowed to collect minor forest products, such as fuelwood, traditional medicines and non-timber products for domestic use only, and are allowed access to ritual sites. To function as incentives, the access and use rights must provide more tangible economic benefits to the people (Dubois 1999). Hence, more alternative income-generating activities to degrading forests are needed to attract full commitment of forest dwellers to protecting rather than destroying the forest. Some of the non-destructive income-generating activities in the jointly managed forest reserves may include controlled harvesting of dead logs (old age and windfalls), beekeeping, promotion of ecotourism and eventually collecting water fees. Revenues from these activities should be distributed equitably among stakeholders.

4 Conclusion

One of the reasons why people carry out activities that degrade forests is because of the high economic benefits they can obtain. There is often little immediate economic gain from conserving forest resources or assuring their sustainable utilisation. Forest management regimes – particularly in Tanzania –have long denied communities legitimate opportunities to use forest reserve resources for their own livelihood profit. Local communities have been deprived of autonomy and sovereignty over their forest resources. The Duru-Haitemba case study of CBFM demonstrates that by restoring these rights and responsibilities to forest communities, the resource base – along with people's livelihood – is likely to improve and become sustainable ultimately.

Nevertheless, the case study of Kwizu Forest Reserve suggests that there is still uncertainty in JFM schemes. Foresters are practising JFM as 'trials' and there is still a gap between policy and practice. In addition, the minds of local communities are not clearly settled on what their rights, returns and responsibilities are in the jointly managed forests, beyond those that they are used to. It appears that the incentives currently offered are not high enough to warrant the full commitment of local communities.

Considering the level of contraventions noted at Kwizu Forest Reserve under JFM, there is need for clear definition of rights, returns and responsibilities of each stakeholder. Because economic gain is the critical motive (whether conscious or unconscious) behind most human actions, more tangible incentives should be offered to all stakeholders in collaborative management. This may be achieved through fair benefit-sharing of returns and promotion of alternative income-generating activities such as ecotourism, beekeeping woodworking and other environmentally-friendly activities. Furthermore, in order to ensure effective involvement, there is a vital need for more training and awareness creation among stakeholders before launching people-centred forest resource management schemes.

In conclusion, in the light of the lessons from Duru-Haitemba, it would be best if local communities took any decision to have autonomy and sovereignty over their forest resources rather than having this imposed on them from the outside. The role of outsiders should remain to assist with technical and legal matters.

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